

PATENT
ATTORNEY DOCKET NO. 2946

SERIAL NO. 09/525,842
Proposed Amendment to Abstract
CLEAN VERSION

Abstract

A process for removing organic contaminants, nutrients and suspended solids from waste water. A three-phase cycle is used, consisting of a mix fill phase, a react fill phase and a react discharge phase. The process eliminates the need for separate basins for anaerobic and anoxic conditions, appropriate time periods for a quiescent environment for solids/liquid separation and mechanical decanter devices normally required to extract the desired effluent quality in conventional sequencing batch reactor systems.

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Abstract

A process [and apparatus for treating waste water using a sequencing batch reactor system in conjunction with a membrane filtration device for solids/liquid separation provides a highly efficient method and apparatus] for [the removal of] removing organic contaminants, nutrients and suspended solids from waste water. A three-phase cycle is used, consisting of a mix fill phase, a react fill phase and a react discharge phase. [In the mix fill phase the reactor environment is controlled to provide an initial anaerobic time period for achieving phosphorous release and denitrification of oxidized nitrogen present in the reactor from the prior cycle. In the react fill phase waste water continues to enter the reactor. The reactor environment is controlled to provide alternating periods of aeration and mixing and mixing only to promote completely mixed aerobic and anoxic conditions. The alternating periods of aerobic and anoxic conditions promote the oxidation of organic and nitrogenous waste products and the biological uptake of phosphorous followed by the denitrification of oxidized nitrogen. Finally, in the react discharge phase, waste water flow into the reactor ceases. The reactor environment is still controlled to provide alternating periods of aerobic and anoxic conditions. The waste water in the reactor is directed to

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a membrane device for solids/liquid separation. The solids/liquid mixture that does not pass through the membrane is returned to the reactor. This treatment approach eliminates the necessity to provide separate anaerobic and anoxic basins.] The [combination of the membrane device with the sequencing batch reactor] process eliminates the [necessity to provide] need for separate basins for anaerobic and anoxic conditions, appropriate time periods for a quiescent environment for solids/liquid separation and [the requirement of] mechanical decanter devices normally required to extract the desired effluent quality in conventional sequencing batch reactor systems.

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1. (Once Amended) A process for the treatment of waste water, comprising the steps of:
drawing waste water into a vessel containing an activated sludge;
mixing the waste water and the activated sludge in the vessel to create a mixture;
exposing the mixture in the vessel to anaerobic conditions for a sufficient time to permit the release of phosphorous and denitrification of oxidized nitrogen;
exposing the mixture in the vessel to alternating periods of aerobic and anoxic conditions for a sufficient time to permit the oxidation of organic contaminants in the waste water and nitrogenous waste products and the uptake of phosphorous followed by the denitrification of oxidized nitrogen;
removing the mixture from the reactor while exposing the mixture to alternating periods of aerobic and anoxic conditions; and
passing the mixture through a membrane unit to separate suspended solids in the mixture from liquid.

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4. (Once Amended) The process of claim 1 wherein the steps of removing the mixture from the reactor while exposing the mixture to alternating periods of aerobic and anoxic conditions and passing the mixture through a membrane unit to separate suspended solids in the mixture from liquid are completed in about 60 minutes.

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7. (New) The process of claim 1 comprising the use of a sequencing batch reactor.

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1. (Once Amended) A process for the treatment of waste water, comprising the steps of:
drawing waste water into a vessel containing an activated sludge;
mixing the waste water and the activated sludge in the vessel to create a mixture;
exposing the mixture in the vessel to anaerobic conditions for a sufficient time to permit the release of phosphorous and denitrification of oxidized nitrogen;
exposing the mixture in the vessel to alternating periods of aerobic and anoxic conditions for a sufficient time to permit the oxidation of organic contaminants in the waste water and nitrogenous waste products and the uptake of phosphorous followed by the denitrification of oxidized nitrogen;
[extracting] removing the mixture from the reactor while exposing the mixture to alternating periods of aerobic and anoxic conditions; and
passing the mixture through a membrane unit to separate suspended solids in the mixture from liquid.

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4. The process of claim 1 wherein the steps of [extracting] removing the mixture from the reactor while exposing the mixture to alternating periods of aerobic and anoxic conditions and passing the mixture through a membrane unit to separate suspended solids in the mixture from liquid are completed in about 60 minutes.

7. (New) The process of claim 1 comprising the use of a sequencing batch reactor.